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A Review of Polar-Plume Observations with SUMER on SOHO

KLAUS WILHELM
Max-Planck-Institut für Sonnensystemforschung, 37191 Katlenburg-Lindau,Germany

Observations of polar coronal holes are reviewed, which have been obtained with SUMER on SOHO. The evidence demonstrates that the plasma conditions in polar plumes and interplume lanes are significantly different in the inner corona. Plume structures in O VI 103.2 nm and Ne VIII 77.0nm extend beyong 1.3 $R_\odot$, with radiances in the plume regions up to 50% highers, but line widths about 15% narrower $R_\odot$ than the interplume regions. The electron density is close to 10^8 cm^{-3} near the limb and decreases to less than 10^7 cm^{-3} at 1.2 $R_\odot$ in plumes, and to half that value in interplume regions. The electron temperatures are less than 800 000K in a plume from 1.03 $R_\odot$ to 1.6C $R_\odot$ decreasing with height. Near an interplume lane, the electron temperature is also low, but stays between 750 000K and 880 000K. The thermal and turbulent ion speeds of Si 7+ reach values up to 80 km s^{-1} in the darkest regions outside plumes. The neon-to magnesium abundance is characterized by depletion factors of 1.7 to 3.5 in plumes relative to interplume regions. The sources of the fast solar wind in polar coronal holes can be seen in the Ne VIII line in thelow corona, either as dark polar caps in radiance diagrams or as regions of predominant blue shift. The average blue is ≈3km s^{-1} with pearks near 10km s^{-1} . The outflow is concentrated in chromospheric network boundaries. Bright points and polar plumes do not show signatures of outflow.